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SCIENCE RESOURCES STUDIES HIGHLIGHTS

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Modest Increase in Company R&D Funding Estimated for 1989

Highlights

- Estimates for 1989 company research and development (R&D) expenditures indicate a modest 6-percent current-dollar increase over 1988. U.S. firms are expected to spend more than $61 billion for R&D, a 2-percent increase in constant-dollar terms over 1988 levels. The 1988 and 1989 spending levels show slight increases from the 1985-87 period when there was no constant-dollar growth in companies' R&D spending. On the other hand, the 1988 and 1989 real spending increases, which average 2.5 percent annually, remain below the 1980-85 period average annual real-dollar increase of 5.5 percent.

- Among the 66 companies responding to a National Science Foundation (NSF) survey, industry officials most often tied their estimated 1988 and 1989 R&D spending to sales and profits levels. For the 44 companies reporting R&D spending increases in both years, the most frequently cited reasons were increased sales and/or profits, development of new technologies, and the necessary funding for promising new products.

- The 22 companies with stable or decreasing R&D spending in 1988 and/or 1989 generally reported lower sales or profits, greater emphasis on cost reduction programs, and closer ties between their R&D and manufacturing operations.

- R&D spending varied widely among the major R&D-performing industries. The chemical industry expects current-dollar R&D spending increases of 8 percent in 1988 and 10 percent in 1989. In contrast, the motor vehicles industry is predicting a decline in R&D spending of 2 percent in 1988 and no growth in 1989.

Company-Funded R&D Expenditures

NSF estimates that company-funded R&D expenditures will exceed $61 billion in 1989, a current-dollar increase of 6 percent over the 1988 level of $58 billion (table 1). This followed a 6-percent increase in 1988 for an average annual increase of

Table 1. Company funds for research and development for the five largest R&D-performing industries

[Dollars in billions]

Selected industry	1986	1987 preliminary	1988 estimated[1]	1989 estimated[1]
Total	$52.8	$54.6	$58.1	$61.4
Chemicals and allied products	8.8	9.5	10.5	11.6
Machinery and electrical equipment	19.7	20.0	22.1	23.6
Motor vehicles and motor vehicles equipment	7.3	7.3	7.2	7.2
Aircraft	4.1	4.3	4.4	4.4
Professional and scientific instruments	4.6	4.8	5.2	5.4
All others	8.3	8.7	8.7	9.2

[1]Estimates were made on the basis of contacts with industrial R&D officials.

SOURCE: National Science Foundation, SRS

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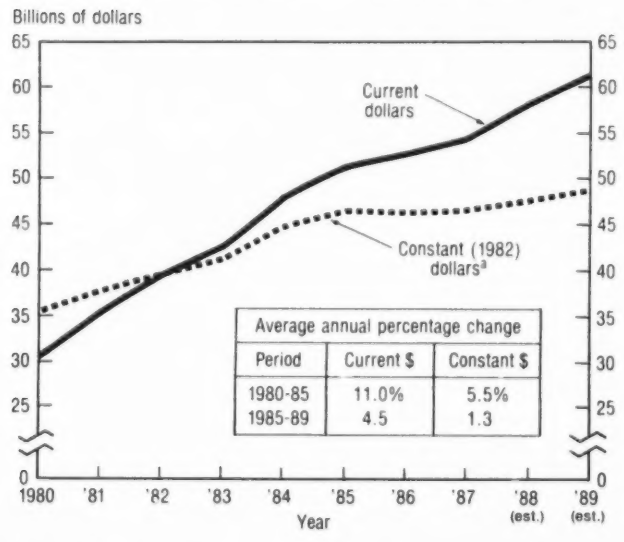
2.5 percent from 1987 to 1989. Although this is an improvement over the 1985-87 period when there was no real growth, the 1987-89 rate of increase is still substantially below the 1980-85 real rate of increase of 5.5 percent annually (chart 1).

These estimates reflected the economic conditions current when NSF contacted R&D officials in the spring and summer of 1988. The U.S. Department of Commerce had just reported that current-dollar manufacturing sales had increased almost 1 percent between the fourth quarter of 1987 and the first quarter of 1988, and current-dollar corporate after-tax profits had increased 0.5 percent during the same period. Companies' current and expected sales levels were the most frequently cited factor in the R&D budget process. Other factors were changes in the firms' R&D funding arrangements and corporate structure.

The 44 companies increasing their R&D expenditures cited most often their higher sales or profits as the enabling factor. Company spokesmen gave the following reasons for the continuing increases in funding: Inflation; company business goals and opportunities; and heightened interest in cooperative research agreements. The development of new technologies and R&D work on promising new products were companies' major funding targets.

In the past four years, cooperative R&D ventures have increased in number. More than 70 percent of the 66 respondents have participated in cooperative research ventures since the National Cooperative Research Act was passed in 1984. Respondent companies that have funded joint R&D ventures since 1984 accounted for 47 percent of U.S. company-funded R&D in 1987. The annual increase in R&D spending by joint venture participants averaged 5.4 percent from 1985 through 1989. This is slightly higher than the national average of 4.5 percent. Nine respondents volunteered that their companies' increases in R&D expenditures in 1988 resulted in part from additional funding of cooperative research ventures.

Chart 1. Company-funded R&D expenditures



[a] Based on the GNP implicit price deflator.
SOURCE: National Science Foundation, SRS

The 22 companies that planned stable or decreasing R&D spending in 1988 and/or 1989 reported lower sales or profits as the major cause. They frequently mentioned new company directions to tie their R&D operations more closely to the manufacturing divisions. They were also more likely than the R&D-increasing firms to cite cost reduction programs or their involvement in mergers, acquisitions, or other restructurings. Ten of the 22 companies were involved in mergers, acquisitions, or other restructurings.

Stock Market Effects

All companies were asked about the effect of the October 1987 stock market decline on their companies' R&D spending. The respondents reported no effects on their R&D budgets although many companies were in tighter cash positions after having allocated funds for stock repurchase plans.

Company R&D Expenditures in the Major R&D-Performing Industries

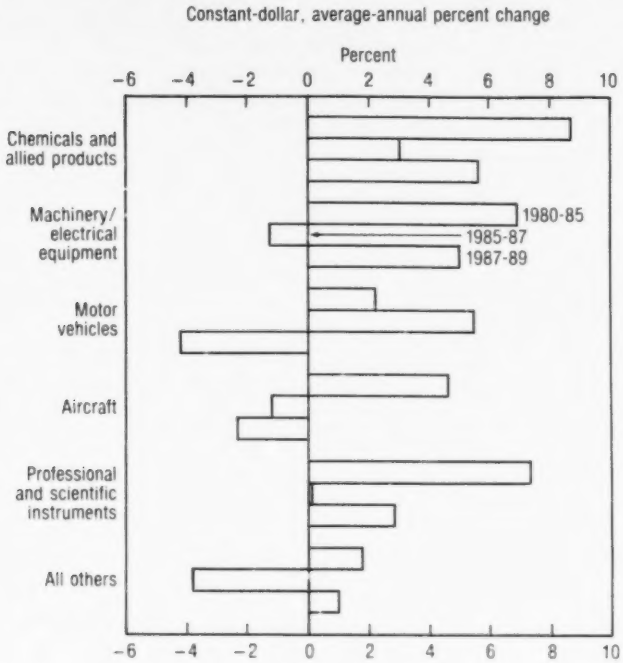
The five industries that together account for 84 percent of company-funded R&D expenditures estimated current-dollar changes from 1987 through 1989 to range from an average annual increase of 9 percent each in chemicals and machinery/electrical equipment to a 1-percent decrease in motor vehicles (charts 2 and 3). These industries are discussed below in the order of magnitude of estimated R&D gains in 1988 and 1989.

Chemicals. Officials in the chemicals industry estimated current-dollar growth in their R&D budgets of 8 percent in 1988 and 10 percent in 1989. Drugs and medicines manufacturers, a major component of the chemicals industry, reported increases in their R&D allocations of 18 percent in 1988 and 17 percent in 1989. This is somewhat higher than drugs and medicines' 14-percent average annual increase from 1980 through 1987. The drug companies reported domestic competition, work on promising new products, and more cooperative research ventures as key reasons for the increases. Company spokesmen from the industrial chemicals segment reported R&D increases of 6 percent in 1988 and almost 7 percent in 1989. Emphasis continues on R&D associated with the advancement and incorporation of new technologies into manufacturing processes. Officials in this industry more than in any other, mentioned that they specifically augment R&D budgets by the projected rates of inflation so that multi-year R&D programs are adequately funded. The lower value of the dollar in international markets has improved chemical sales overseas which, in turn, have provided additional funds for U.S. R&D activities.

Machinery and electrical equipment. This industry is expected to increase R&D spending 10 percent in 1988 and 7 percent in 1989. The machinery and electrical equipment industries are combined in this year's report because incomplete reporting by one industry created confidentiality problems. Among the electrical equipment companies, communications-equipment manufacturers estimated increased R&D spending of 7 percent in 1988 and 5 percent in 1989 in anticipation of increased sales and profits. Semiconductor companies reported plans for healthy increases in R&D: 11 percent in 1988 and 9 percent in 1989. Reasons given included growing sales and an improving national economy.

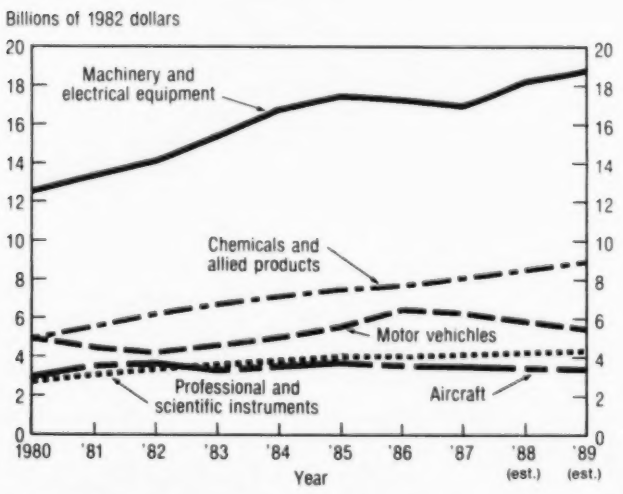
Respondent computer companies plan to increase R&D spending as a result of domestic and foreign competition and

Chart 2. Changes in company R&D funds



SOURCE: National Science Foundation, SRS

Chart 3. Company R&D funds for the five largest R&D-performing industries


Billions of 1982 dollars
Machinery and electrical equipment
Chemicals and allied products
Motor vehicles
Professional and scientific instruments
Aircraft
1980 '81 '82 '83 '84 '85 '86 '87 '88 (est.) '89 (est.)
Year

SOURCE: National Science Foundation, SRS

the fast pace of new technologies development within the industry.

Professional and scientific instruments. The instruments industry estimated increases in R&D spending of 8 percent in 1988 and 6 percent in 1989. In the scientific and medical instruments segment, R&D budgets were estimated to increase 9 percent in 1988 and 8 percent in 1989. Spokesmen reported the opportunity presented by concepts for new products and technologies, and the ability to pay for R&D from improved sales and earnings, as significant factors in the spending increases. Several companies also reported increased cooperative research activity.

Aircraft. The aircraft industry R&D budgets were estimated to increase less than 1 percent in 1988 and about 2 percent in 1989. Although the survey reached company officials when favorable 1988 first quarter national and aircraft industry financial figures were available, second quarter results showed additional aircraft improvement. Thus, 1989 R&D spending may exceed these modest estimates. Some respondents reported that Department of Defense ceiling caps on Independent Research and Development (IR&D) spending were expected to have a limiting effect on company R&D spending over the next two years.

Motor vehicles. R&D spending plans included decreases of 2 percent in 1988 and no change in 1989. Many of the budget cuts are part of corporate plans to reduce costs in all divisions, including the R&D department. Despite the recent cuts, motor vehicles companies remain committed to substantial R&D spending—more than $7 billion in every year from 1986 through 1989. Officials mentioned among their R&D activities work directed at reducing costs within the manufacturing process and increased R&D efforts to meet Federal automobile safety, emissions, and fuel efficiency standards.

Other Industries

Petroleum refiners and extractors. This industry estimated an increase in R&D spending of 5 percent in both 1988 and 1989. Petroleum industry R&D is estimated to be $2.0 billion in 1989, up from $1.8 billion in 1987. Although corporate leaders acknowledge that their companies must continue to fund experimental projects to ensure their technological leadership, most said they were also carefully weighing costs against benefits in their R&D operations.

Primary metals. Company spokesmen estimated a 7-percent increase in R&D spending in 1988 after several years of flat or declining spending. Company officials said that improving sales and profits have allowed increases in work on new products. For 1989, the officials projected spending increases of 1 percent as unique projects are completed and cost containment programs bear fruit.

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This report, the seventh in a series, is based on mail responses to an annual NSF inquiry to its Industrial Panel on Science and Technology, and on interviews with R&D officials in the major R&D-performing industries. Replies were received from 66 of 92 company officials contacted from April through September 1988 and included 14 of the top 20 R&D-spending companies in the United States as identified by R&D expenditures reported in 10-K submissions to the U.S. Securities and Exchange Commission. The participating companies accounted for one-half of all U.S. company-funded R&D expenditures.

Participants were asked to estimate the growth in their company-funded R&D expenditures during 1988 and 1989 and to identify major factors responsible for projected changes. Respondents were also asked whether the October 1987 stock market decline had affected their companies' cash flow positions sufficiently to depress R&D spending. This *Highlights* report is based on their responses.

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